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CITATION:

Ohnishi, Hiroshi. An analysis of the Asian crisis by a capital-linked multicountry model. 京都大学経済学部Working paper 1998, 41

ISSUE DATE:

1998

URL:

<http://hdl.handle.net/2433/37926>

RIGHT:



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# AN ANALYSIS OF THE ASIAN CRISIS BY A CAPITAL-LINKED MULTICOUNTRY MODEL

HIROSHI OHNISHI\*

*Where the causes of the Asian financial crises are concerned, we believe that a structural accumulation of trade deficits is a more fundamental cause than a failure of financial controls. Among Asian countries that are targets of international arbitrage, chronic trade deficits have led to a shortage of foreign currency reserves, making it impossible for such countries to prop up their own currency through buying.*

*Thus, forecasting future movements in these structural trade deficits has relevance to forecasting the course of the currently depressed exchange rates. Predicted results produced by the "Kyoto University Pacific Rim Economic Model" maintained by the authors reveal an overall stabilization and moderate improvement in the real exchange rates of 10 Asia-Pacific countries.*

*Using the same model, we investigated the effect of capital flight on individual Asian countries, based on a theory that a rise in productivity in the U.S. attracts capital, which has a negative effect on several other countries. Results indicated that the ASEAN country crises will not continue in the long run, and that the crisis in South Korea should be seen as the origin of an overall decline in the rate of growth. (JEL C53, F01, F17, F21, F31, F32, O53)*

## I. FOREIGN TRADE BALANCES AND EXCHANGE RATES

The principal factors held up as the causes of the Asian monetary crises are (1) the "bubble" economy, its excessive reliance on short-term capital, and other failures in financial control, and (2) readjustment of exchange rates intended to bring about balanced foreign trade. The authors believe that the first set of factors is no more than a proximal cause, while the second set is fundamental. The reasoning here is that even if financial controls were largely in place, trade deficits could not persist in the long run, and exchange rates would ultimately have to be adjusted. The argument also stems from the realization that among targets of international arbitrage, chronic trade deficits have led to a shortage of foreign currency reserves, making it impossible for such countries to prop up their own currency through buying. This reasoning would indicate that long-term trade deficits are the basic cause of the recent currency falls.

It is also true that Taiwan and other trade-surplus countries have felt the effects

of the recent turmoil, albeit slightly, but rather than ascribing these to country-specific causes, we suggest that the pervasive currency falls in other Asian countries may be due to a predicted negative effect operating through capital movements and trade. This explanation would also account for the relatively unscathed transition through the crisis in such cases. The depth of the Indonesian crisis results from a miscalculated political response.

Even if such trade deficits are indeed a fundamental cause of the crises, we believe that if currencies were not pegged to the dollar and slow, orderly currency falls resulted, pervasive crisis conditions like those of the present would not have developed. The significance of this is that while the present "governmental failures" deriving from the dollar peg system are an important lesson for the future, the suggestion that a fundamental cause of the currency falls does not lie within the dollar peg system itself must be corroborated now.

Stated in reverse, previously overvalued Asian currencies were a fundamental cause of trade deficits, and the present currency adjustments have brought about a contrary improvement in trade balances. In reality, a reduction in imports after the currency crisis gave Thailand its first current account surplus in 14 years, in October, 1997. Malaysia in 1997 also recorded its first trade surplus in 4 years, and South Korea shifted to a surplus position as of the end of 1997. The margin of surplus increased even in Indonesia. A consequent recovery in the exchange rates of these countries' currencies has already been seen except for rupiah. This is same as prior currency crises in the world (see IMF(1998)). Of course, the background of contractionary fiscal policy and other efforts in each country cannot be ignored.

Figure 1 below is a graph of Asian currency movements over several years. As the figure shows, China undertook an initial currency devaluation at the beginning of 1994, and the yen declined beginning roughly in the summer of 1995. Following a long period of high values of Asian currencies versus the yen and the Chinese yuan (which engendered long-term trade deficits), we see the current fall in these currencies. As shown, adjustment of the Asian currencies versus other principal currencies is extremely slow. In other words, adjustment of trade balances to exchange rates is rapid, while adjustment of exchange rates to trade balances is incomplete. Even though this divergence from underlying fundamentals is central to the crises, the essence of the situation remains that the crises have served as a means to adjust this divergence to such fundamentals.

## **II. TRADE BALANCES AND LONG-TERM EXCHANGE RATE PREDICTION**

What we first must ascertain is whether it was inevitable that these necessary currency adjustments occurred precipitously. In other words, even if a currency fall itself was inevitable, it was difficult to predict when the currency would fall. We therefore begin with a quantitative analysis addressing the issue at a level excluding the question of when a currency fall will occur; essentially, a level merely inquiring whether or not a decline is present as a trend. To this end, this report uses the international linkage model that we have recently developed, the "Kyoto University Pacific Rim Economic Model (KYPAC-5.3)."

Since space does not permit a detailed description of the model here, details are left to Ohnishi (1998a, 1998b) and the Kyoto University Pacific Rim Database (<http://pacific.kyoto-u.ac.jp/>), and only the following characteristics of the model are described here in brief.

- (1) The primary objective of the model is to track long-term changes. So, GDP is determined not by demand side but by supply side.
- (2) Multi-country linkages for each country model depend primarily on capital balance functions. Here, capital balance is a function of the ratios to other countries' profit rate = marginal productivity of capital.
- (3) The 10 economies of the U.S., Japan, South Korea, China, Taiwan, the Philippines, Thailand, Malaysia, Indonesia, and Australia make up the studied region.

The model is also characterized by a deport of exogenous variables, excluding 7 dummy variables, but the foregoing 3 characteristics are the important ones in the context of this paper. The first among these 3 characteristics is expressed graphically in the following Figure 2. In the figure, the segments connected by the ( $\Delta$ ) symbol represent the actual history, and those connected by the ( $\times$ ) symbol represent the history as explained by the model. Though smooth fluctuations like those of the capital-labor ratio (the most important variable in the model) are tracked relatively well in interim periods, only the overall trend is tracked successfully for widely fluctuating variables such as the trade balance/GDP ratio; however, this is not unsatisfactory for revealing long-term movements. The significance of this is that while the model cannot track rapid movements like those occurring at present, it can still predict long-term movements. It is important to know whether the current crises are transient or likely to persist indefinitely, and the relevant results of long-term predictions made out to 2025 using the model are shown in Tables 1 through 3.

Table 1 shows real exchange rate predictions determined by the model endogenously for the 10-country Asia-Pacific region. Here, "real exchange rates" are

calculated by assuming identical inflation rates in each country. The end to the decline and the modest recovery of exchange rates that we have seen for individual Asian countries appear to be well predicted, though the current severe fall in the Indonesian currency is not. These calculated results were produced at the end of 1997. For Japan, the yen is predicted to rise slightly, a result based on the trade-related prediction of a continuing trade surplus.

Table 2 shows GDP predictions on a "real dollar" base, where "real dollar" indicates adjustment to the U.S. rate of inflation. The first striking result is that growth rates in the period of 1995-2000 in Thailand, Malaysia, Indonesia, and South Korea are negative, even if those in the period of 1995-1997 are high. However, growth rates recover thereafter. The implication is that the current crises are best perceived as a fundamentally short-term shock. Among these four countries though, however, the South Korean recovery is weak and can be taken as the origin of a long-term process of a decline in the rate of growth. In this table forecasting essentially lower growth rates the more developed the country, and higher growth rates the less developed the country, this result can be understood as a process of growth rate decline in a South Korea that represents a quasi-developed country.

Table 3 displays predicted results for foreign trade, which are intimately related to exchange rate predictions in our model. This table indicates a shrinkage of relative trade deficits in Thailand, South Korea, and the Philippines, all of which suffered currency falls (same prediction was made by Komine(1998)). However, unprecedented deficits are indicated for Indonesia and Malaysia, where reductions in petroleum exports are foreseen, and a low level of confidence regarding this fact may be connected to their present crises.

In sum, the current crises do not appear to be fundamental or long-term, with some exceptions. They are correctly viewed as an adjustment of exchange rates divergent from the "fundamentals", and they should not be seized upon as evidence of essential weakness in the Asian economies (see Sachs(1997) and Radelet & Sachs(1997)).

### **III. CAPITAL FLIGHT-RELATED SIMULATION**

While the foregoing explanation shows that the current "crises" are basically not irreversible in Asian developing countries, the model also allows one other extremely interesting simulation. Results are shown in Table 4, and these indicate how a macroeconomic increase in productivity in the countries in the left column would affect

total production in the countries in the top row. For each of the 10 countries, Table 4 indicates the +/- direction of the effect of such increased productivity, and among these, note should be taken of the effect on other countries of the U.S., in the top row.

Specifically, a negative effect is indicated for every country other than Japan, meaning that increased productivity in the U.S. raises its profit, which attracts a flow of capital to the U.S. Recent economic conditions in the U.S. are naturally interpreted as "increased productivity" in some sense, and this evokes a causal relationship in which such increased productivity triggered the crises in Thailand and South Korea, beginning a capital outflow. Multi-country econometric models allowing a direct simulation of such international capital movements in Asian developing countries are extremely limited. Apart from the model of the authors, there is only that of Takenaka, *et al.* (1986), but this model is extremely old, leaving only the model of the authors. This is the reason for carrying out such a simulation here.

In addition to a simple +/- indication of U.S.-induced effects on the GDPs of the 9 other countries, more interesting results describing the extent and course of the effects can also be obtained. Results are shown in Figure 3 and indicate the effect of a US \$100 billion (1995 value) increase in productivity in the U.S. in 1994.

A close examination of these results reveals the very interesting fact that in the initial period, the negative effects are greatest on South Korea and Thailand. This is because the capital outflow phenomenon at the start of the crisis was the most pronounced in these two countries. Also of great interest is the fact that while an initially large negative effect on China later shifts to a positive effect, an initially small negative effect on Australia subsequently grows. This would seem to reflect fundamental differences in growth potential in these two countries.

One other interesting fact in a comparison of these event patterns is that the negative effect on Thailand and the negative effect on Taiwan are opposites in terms of early versus late periods. This indicates that recovery is more rapid in Thailand, or perhaps that the fundamental growth potential in Taiwan is weaker than Thailand. It is also possible that the Thai crisis is affected by deficiencies in policy and is not helped in this respect, but it is in any event interesting that after the fifth year in the figure, the largest negative effects are seen in the developed and semi-developed countries of Australia, South Korea, and Taiwan. Current global conditions of overall "convergence" illustrate that growth rates are essentially lower the more developed the country, and the results may also reflect such latent growth rate levels.

In sum, it has been shown that the ASEAN country crises will not continue for an extended period, that the South Korean crisis should be seen as part of an overall



process of growth rate decline, and that the capital flight inciting these crises may be related to a temporary increase in productivity in the U.S.

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Figure 1 Exchange Rates of Asian Currencies After 1994

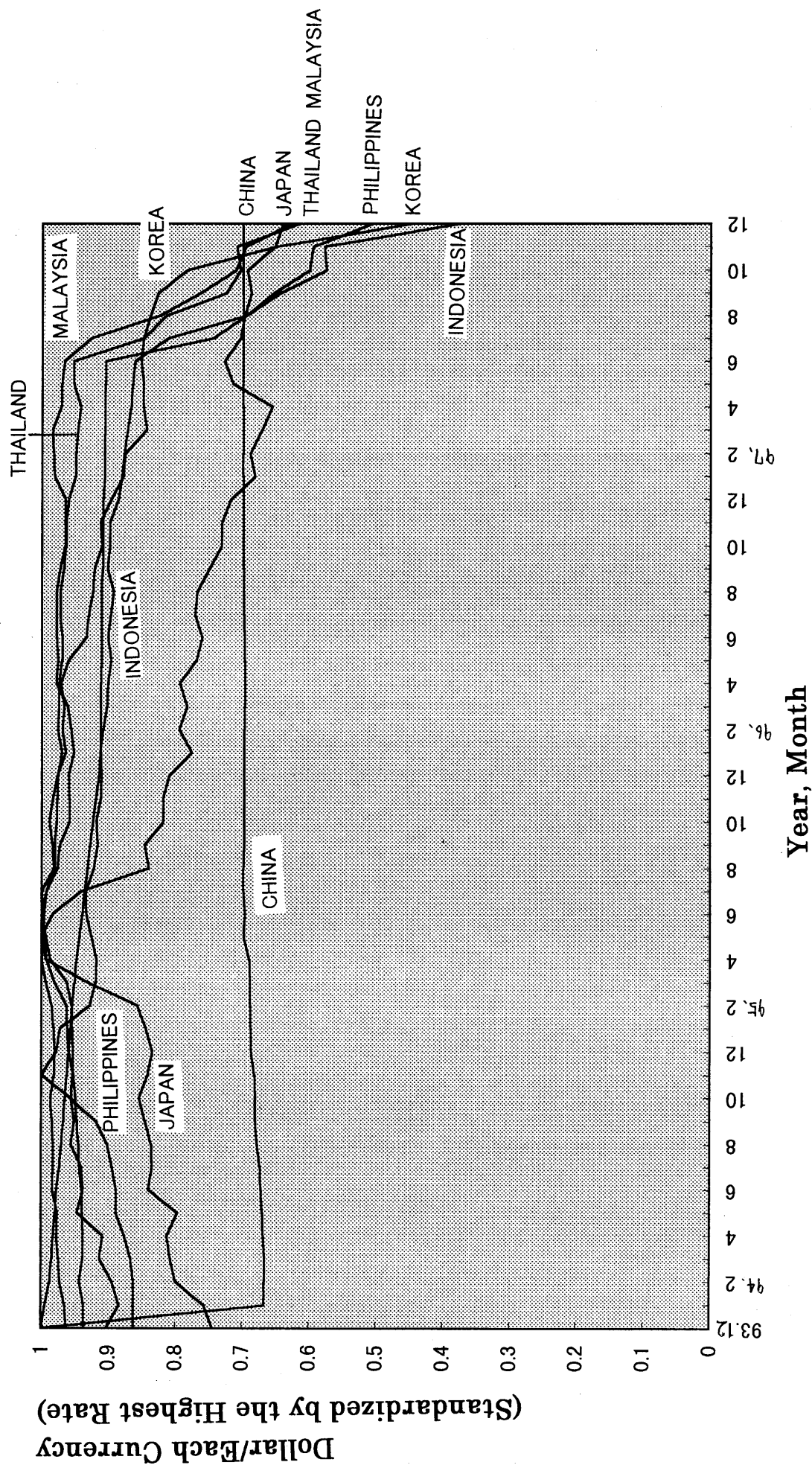
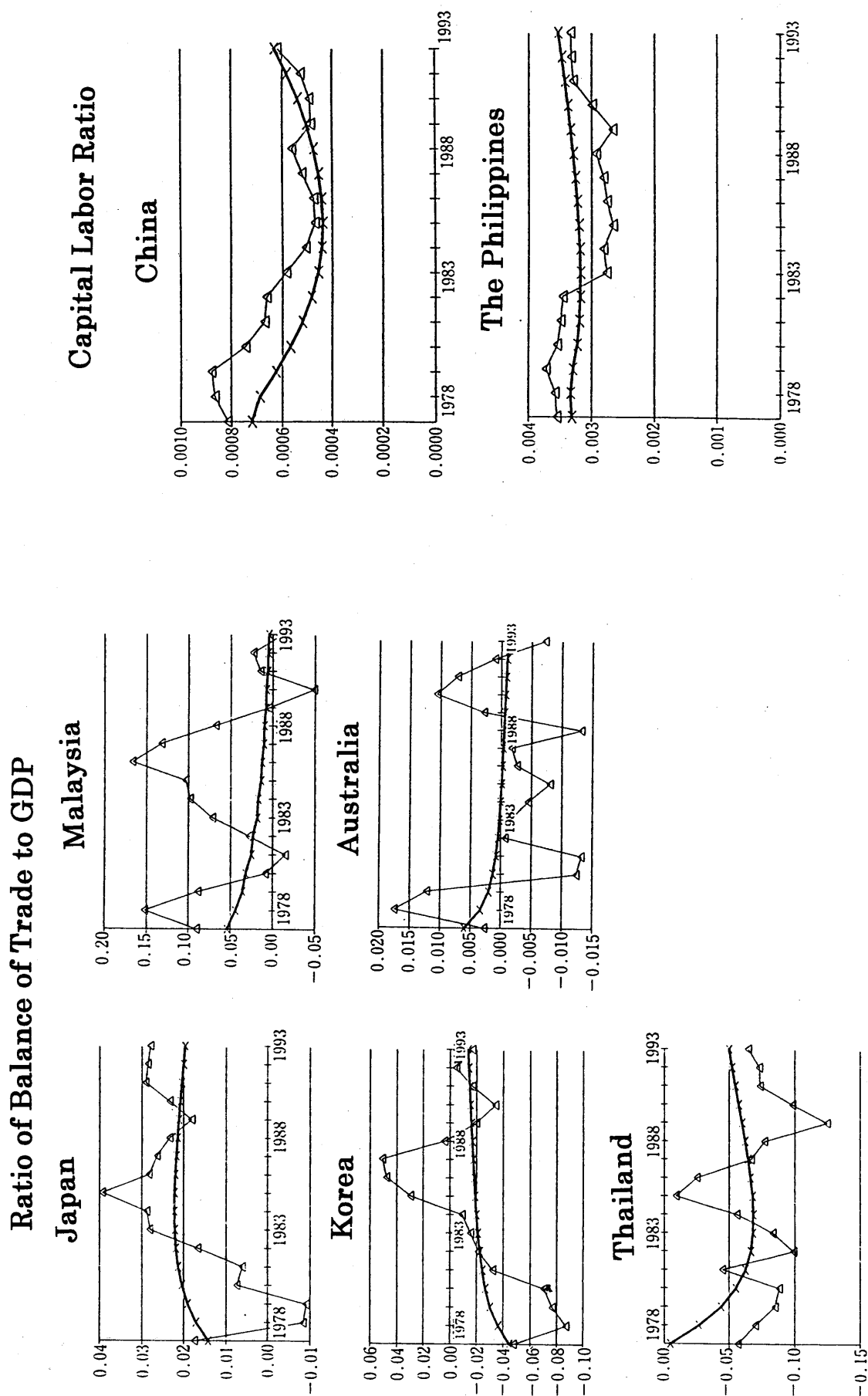


Figure 2 Result of the Final Test



**Table 1 Projected Real Exchange Rates through 2025****(each currency/ dollar) (average growth rates before 5 years ago in parenthesis)**

YEAR	1995	2000	2005	2010	2015	2020	2025
JAPAN	94.1	118 (4.6)	105 (-2.4)	98 (-1.4)	94 (-0.9)	91 (-0.6)	89 (-0.3)
KOREA	771	1124 (7.8)	1083 (-0.7)	1053 (-0.6)	1029 (-0.5)	1011 (-0.4)	1000 (-0.2)
CHINA	7.80	8.23 (1.1)	8.39 (0.4)	8.28 (-0.3)	7.91 (-0.9)	7.41 (-1.3)	6.87 (-1.5)
TAIWAN	27.3	32.5 (3.5)	33.5 (-0.1)	32.5 (0.3)	32.7 (0.1)	33.0 (0.2)	33.5 (0.1)
PHILIPPINES	25.7	32.6 (4.9)	31.9 (-0.4)	31.5 (-0.2)	31.2 (-0.2)	31.1 (-0.1)	31.0 (-0.1)
THAILAND	24.9	38.1 (8.9)	37.1 (-0.6)	36.3 (-0.5)	35.8 (-0.4)	35.4 (-0.2)	35.1 (-0.2)
MALAYSIA	2.50	3.36 (6.1)	3.30 (-0.4)	3.26 (-0.2)	3.24 (-0.1)	3.23 (-0.1)	3.23 (0.0)
INDONESIA	2249	3382 (8.5)	3439 (0.3)	3493 (0.3)	3534 (0.2)	3564 (0.2)	3586 (0.1)
AUSTRALIA	1.35	1.18 (-2.7)	1.17 (-0.2)	1.17 (0.0)	1.17 (0.0)	1.17 (0.0)	1.17 (0.0)

**Table 2 Projected GDP (billion dollar, at constant prices in 1995)****(average growth rates before 5 years ago in parenthesis)**

YEAR	1995	2000	2005	2010	2015	2020	2025
U.S.A.	7246	9160 (4.8)	10685 (3.1)	9840 (-1.6)	8077 (-3.9)	9874 (4.1)	11360 (2.8)
JAPAN	4711	4130 (-2.6)	4488 (1.7)	4813 (1.4)	5115 (1.2)	5401 (1.1)	5673 (1.0)
KOREA	456	440 (-0.7)	558 (4.9)	666 (3.6)	767 (2.8)	863 (2.4)	958 (2.1)
CHINA	691	849 (4.2)	1273 (8.4)	2117 (10.7)	3623 (11.4)	6428 (12.2)	12328 (13.9)
TAIWAN	261	292 (2.3)	350 (3.7)	399 (2.7)	443 (2.1)	483 (1.8)	523 (1.6)
PHILIPPINES	74	84 (2.6)	117 (6.8)	161 (6.6)	224 (6.8)	314 (7.0)	446 (7.3)
THAILAND	167	153 (-1.7)	213 (6.9)	288 (6.3)	384 (5.9)	503 (5.6)	653 (5.4)
MALAYSIA	80	74 (-1.5)	93 (4.7)	114 (4.0)	120 (1.0)	128 (1.4)	195 (8.7)
INDONESIA	201	139 (-7.1)	184 (5.7)	257 (7.0)	381 (8.1)	411 (9.5)	1029 (11.4)
AUSTRALIA	348	415 (3.6)	482 (3.1)	531 (2.0)	572 (1.5)	623 (1.7)	689 (2.2)

**Table 3 Projected Ratios of Balance of Trade to GDP (%)**

YEAR	1995	2000	2005	2010	2015	2020	2025
U.S.A.	-2.2	-1.5	-1.1	-1.3	-1.7	-1.3	-1.1
JAPAN	2.3	1.9	1.8	1.7	1.6	1.5	1.4
KOREA	-2.3	-2.1	-1.6	-0.8	-0.7	-0.7	-0.8
CHINA	2.8	3.1	3.9	4.4	4.7	4.8	4.9
TAIWAN	3.2	2.3	2.0	2.0	1.9	1.6	1.5
PHILIPPINES	-14.7	-11.6	-8.9	-6.6	-4.9	-3.7	-2.7
THAILAND	-10.3	-7.5	-5.4	-3.8	-2.8	-2.2	-1.6
MALAYSIA	-4.9	-5.2	-5.7	-5.9	-6.0	-6.5	-6.4
INDONESIA	2.4	1.6	1.0	0.4	-0.1	-0.5	-0.8
AUSTRALIA	-1.2	-0.2	-0.4	-0.4	-0.6	-0.9	-1.0



# Table 4 International Affects by

## Other Countries ' Productivity Shock

	Schock Sustaining Countries									
	USA	JPN	KRA	CHN	TWN	PHL	THI	MLS	IND	AUS
Original Effect in										
USA	+	-	-	-	-	-	-	-	-	-
JAPAN	+	+	+	+	+	-	0	-	-	+
KOREA	+	+	-	-	-	-	-	-	-	+
CHINA	-	+	+	-	-	-	-	-	-	-
TAIWAN	-	-	+	-	-	-	-	-	-	-
PHILIPPINES	-	+	+	-	-	-	-	-	-	-
THAILAND	-	+	-	-	-	-	-	-	-	-
MALAYSIA	-	-	+	-	-	-	-	-	-	-
INDONESIA	-	-	+	-	-	-	-	-	-	-
AUSTRALIA	+	+	+	-	-	-	-	-	-	-

